

REPORT

Milford Dart: Draft Construction Environmental Management Plan



Prepared for

Milford Dart Limited

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42163947

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Section 1

Introduction

1.1 Purpose

Milford Dart Limited has applied to the Department of Conservation (DoC) for concessions under the Conservation Act 1987 and the National Parks Act 1980, with respect to the investigation, construction, operation and maintenance of a ~10.4 km land transport tunnel and associated facilities in Fiordland and Mount Aspiring National Parks.

Resource consent applications under the Resource Management Act 1991 will be made to Southland District Council, Queenstown Lakes District Council, Southland Regional Council and Otago Regional Council (the 'resource consent authorities') in the near future.

This document represents the Draft Construction Environmental Management Plan (CEMP) for the project. The purpose of the CEMP is to:

- a) provide a framework for environment management of the construction phase; and
- b) demonstrate to DoC and resource consent authorities that construction effects on the environment can be appropriately managed, and where potentially considered adverse, the effects can be avoided, remedied and mitigated.

The vision and objectives of this CEMP are outlined in Section 2.

An equivalent draft environmental management plan has been prepared for the operation phase (OEMP).

1.2 Status of CEMP

The current phase of the project is the pre-feasibility concept design and concession application phase. In this regard this CEMP should be considered as a draft of the final CEMP. It is expected that this CEMP will be expanded and periodically updated as design advances and the project progresses into construction, particularly to capture any concession and consent conditions that arise out of consenting processes.

Following revisions, this document will become the Project CEMP. Once the project reaches the implementation stage the principal contractor will be required, through the contract specifications, to submit a Construction Management Plan and Construction Execution Procedures prior to construction commencing which are consistent with and capture all the conditions applicable on the project. These subsequent documents will be submitted to the relevant regulatory authorities for review. Other documents and processes required from the contractor(s) are detailed in Section 4 of this report.

The CEMP will also be used as the template for the contractor(s) of the project to develop detailed and specific supplementary environmental management plans and procedures, including but not limited to:

- Erosion and Sediment Control Plan
- Water Discharge Plan
- Dust Management Plan
- Stormwater Management Plan
- Construction Noise Management Plan
- Traffic Management Plan
- Spill Contingency Plan
- Rehabilitation Plan
- Stakeholder Communication Plan
- Accidental Discovery Protocol.

Section 1

Introduction

1.3 Legislation

In addition to the requirements of this CEMP, the Milford Dart project will be subject to compliance and, where relevant, approvals under the following legislation (note list is not necessarily exhaustive):

- National Parks Act 1980
- Conservation Act 1987
- Resource Management Act 1991
- Crown Minerals Act 1991
- Building Act 2004
- Historic Places Act 1993
- Biosecurity Act 1993
- Health and Safety in Employment Act 1992
- Hazardous Substances and New Organisms Act 1996.

1.4 Structure of this Report

The remainder of this report is structured as follows:

- *Section 2 – Vision and Objectives*
The vision and objectives that provide the framework for this CEMP.
- *Section 3 – Summary of Construction Activities*
A summary of all the construction activities pertaining to the Milford Dart project.
- *Section 4 – Construction Planning*
An overview of the procedures and plans that will be initiated prior to construction.
- *Section 5 – Management Objectives*
A full list of management objectives by topic heading. Under each topic, the issues, opportunities and management strategies for those management objectives are identified.

Section 2

Vision and Objectives

2.1 Vision

Milford Dart's vision for the construction phase is

To undertake a world class level of environmental management for construction, such that impacts on environmental and conservation values are kept to the absolute minimum necessary to facilitate construction in a practicable and safe manner.

This vision recognises the location of the project in the *Te Wāhipounamu - South West New Zealand World Heritage Area*. This is one of only approximately 400 special natural and cultural sites recognised globally by UNESCO (United Nations Educational, Scientific and Cultural Organization). Fiordland and Mount Aspiring National Parks are included in the World Heritage Area for their outstanding natural features, superlative landscapes, and for containing large areas of limited human influence.

The intended outcomes of this vision is a construction project which:

- Minimises the area required for the construction footprint
- Re-establishes and enhances those natural values within the construction footprint that are not required for future operation activities
- Has 'zero impact' on natural values beyond the construction footprint, and where appropriate opportunities exist, to enhance natural values beyond the construction footprint
- does not significantly detract from the experience of visitors to the National Parks
- acknowledges Tangata Whenua and their role as kaitiaki
- is open and engaged with local communities and statutory authorities, and
- is safe for users, Park visitors, and construction personnel.

Milford Dart will strive to achieve the above outcomes through this CEMP, and through the conditions of any statutory approvals.

2.2 CEMP Objectives

The objectives of this CEMP are to identify:

- 1) The key environmental issues and National Park values potentially affected by construction activities.
- 2) The management objectives relating to those issues.
- 3) Opportunities to enhance National Park values throughout the construction phase.
- 4) Management strategies to avoid, remedy and mitigate adverse effects on National Park values, to the extent that the vision can be achieved.

2.3 Management Strategies

These are detailed on an issue by issue basis in Section 5 of this report.

Section 3

Construction Activities

3.1 Overview

Construction of the Milford Dart tunnel and related facilities is a significant project spanning up to 5 years, from initial site establishment through to completion of site restoration and rehabilitation. At its peak, up to 100 construction related staff will be employed on the project.

Construction work will principally be based in the Hollyford Valley, approximately two kilometres north of Gunns Camp on the Lower Hollyford Road. The Hollyford Airstrip will serve as a construction staging area and to dispose of tunnel spoil received via the Hollyford portal. This end of the project is located in Fiordland National Park.

The Routeburn tunnel portal is located approximately 600 metres beyond the Routeburn Shelter area, near the Double Barrel Falls. This end of the project is located in Mount Aspiring National Park.

Excavation of the ~10.4 km tunnel, which will have a finished internal diameter of ~4.5 – 4.7 m, will principally be carried out by a tunnel boring machine (TBM), apart from a short section at each portal which will be formed through drilling and blasting. TBM tunnel excavation will take place from the Hollyford Valley. A number of facilities will be required at the Hollyford end for the duration of the construction period, including diesel powered generators, substations, workshops, concrete batching plant and staff/workforce buildings.

Upgrades of the Lower Hollyford and Routeburn Roads will be required to allow the construction (and operation) phase to occur. The Lower Hollyford Road will only require minor widening at specific locations for traffic safety, from the Hollyford Airstrip through to the Milford Road (State Highway 94). The Routeburn Road will need to be widened in places and sealed for access and safety reasons. On both the Lower Hollyford and Routeburn Roads, improvements to bridge and culvert capacity may also be required.

3.2 Summary of Construction Activities

The following sections summarise the various construction related activities associated with the Milford Dart project. Greater detail can be found in the Environmental Impact Assessment (June 2006) lodged with the Department of Conservation and in the Technical Description Update of August 2007.

3.2.1 Dart Passage and Hollyford Portal

- Formation of ~100 m access road to the portal.
- Formation of portal through drilling and blasting and excavation activities.
- Establishment of reinforced concrete portal structures and backfilling of earth.
- Assembling of hard-rock TBM.
- Establishment of facilities necessary to support the TBM and tunnel construction, including diesel generators, substation, compressors and tunnel fans.
- Establishment of accommodation facilities necessary for the workforce (at a location yet to be confirmed).
- Boring of a ~10.4 km tunnel with an approximate diameter of 5 m (finished internal diameter of 4.5-4.7) m, at an approximate grade of 3.33%, by the TBM.
- Stabilising/lining of rock in the tunnel using rock-bolting and shotcrete.
- Removal of approximately 256,000 m³ of tunnel spoil.
- Controlling and discharging groundwater from the tunnel.

Section 3

Construction Activities

- Lining and preparation of the tunnel for the operation phase, including establishment of a concrete tunnel invert, and installation of power, lighting, communications, and guidance systems.

3.2.2 Hollyford Airstrip

- Disposal of ~256,000 m³ of tunnel spoil.
- Processing of aggregate for concrete supply to the Dart Passage, including a screening and crushing plant.
- Establishment of a concrete batching plant and testing laboratory
- Establishment of water treatment facilities to treat tunnel discharge water and concrete batching plant water, prior to discharge to the Hollyford / Whakatipu Ka Tuka.
- Establishment of storage areas and buildings for tunnel materials and plant.
- Establishment of a workshop for repairs and servicing of tunnel plant.
- Establishment of office accommodation, lunch room, meeting room, showers, toilets and drying room.
- Fuel storage and re-fuelling facilities. (Note these may be located at the Hollyford portal area).
- A water supply well for potable water.

3.2.3 Routeburn Portal

- Construction of a ~600 m access road to the Routeburn Portal, and laying of underground power and communications from Routeburn Road.
- Formation of a portal through drilling and blasting and excavation activities.
- Establishment of a reinforced concrete portal structure and backfilling with earthfill.
- Establishment of temporary facilities to support staff, including lunch room, toilets, office and first aid.
- Establishment of area for portable generator, compressor and tunnel ventilation fan.
- Water treatment facility.
- Disassembling of TBM upon TBM breakthrough.

3.2.4 Lower Hollyford Road and Routeburn Road

- Upgrading and widening of road pavement to allow safe passage of construction vehicles.
- Removal of vegetation as necessary to maintain safe sight visibility.
- Upgrading of bridges and culverts to support construction vehicles.

Section 4

Construction Planning

4.1 Programme of Construction Works

The principal Contractor will be required to prepare and submit a detailed Programme of Construction works. This programme shall take account of all matters identified in this CEMP.

The programme would typically evolve from a programme submitted with the tender (Tender Programme), to a Base Construction Programme once the contract has been awarded.

The programme will include the processes outlined in Sections 4.1.1 to 4.1.4 below.

4.1.1 Environmental Impact Register

An Environmental Impact Register will be produced and maintained. This would register impacts under the various topic areas covered in Section 5 of this report.

4.1.2 Environmental Action Plan

An Environmental Action Plan (EAP) will be prepared to identify and sequence environmental activities that are needed in order to complete a required construction process. The EAP will identify reference documentation, the approval required to complete that activity, and the verification documentation to be produced as evidence of satisfactory completion.

4.1.3 Risk Assessments and Risk Register

All activities undertaken on site will be subject to an ongoing risk assessment process, including engineering and non-engineering aspects. For the environmental risks, risk assessments will be undertaken by key environmental personnel following an approved procedure which will:

- Identify the significant environmental impacts to be anticipated;
- Assess the risks of these impacts;
- identify the control measures to be taken and reassess the risk; and
- Report where an inappropriate level of residual risk is identified so that appropriate action can be taken.

The residual risks will only considered acceptable if:

- The severity of the outcomes is reduced to the lowest practical level;
- The number or risk exposures are minimised; and
- All reasonably practicable mitigation measures have been taken.

The environmental risk register will be produced in conjunction with the overall project risk register and maintained.

4.1.4 Construction Execution Procedures

Construction Execution Procedures will be completed by the contractor, in consultation with on-site environmental staff and environmental specialists.

Section 4

Construction Planning

4.2 Control of Construction Processes

4.2.1 Training, Awareness and Competence

It is very important that all construction staff:

- a) understand the importance and value of the National Park environment they are working in, and adopt behaviours consistent with this environment (including cultural awareness); and
- b) are committed to complying with all relevant statutory approvals and legislation; and
- c) comply with all health and safety procedures.

To this end, all construction staff will be required to go through comprehensive environmental awareness training prior to construction commencing. Refresher training throughout the construction phase will be implemented as appropriate.

4.2.2 Site Environmental Officer

The Contractor will be required to appoint and maintain on site daily a Site Environmental Officer (SEO), who shall be responsible for implementing and administering the CEMP, and monitoring environmental quality standards. The SEO shall have the authority to direct the works to comply with the CEMP, and shall be directly responsible to the Contractor's Site Manager.

The SEO shall be appropriately experienced in the type of work and trained in environmental management, and shall not hold a line control management position directly supervising construction work. It may be acceptable for the SEO to carry out other duties such as Health and Safety management which are not directly related to supervision of the construction works.

4.2.3 Inspections

Daily inspections will be carried out by the SEO (and others as appropriate) of construction areas to verify that housekeeping and supporting controls are being implemented effectively.

4.2.4 Monitoring and Reporting

The Contractor will be required to provide an assessment of the Project's environmental performance at a frequency of no greater than monthly intervals to the Milford Dart management team. This assessment should cover all requirements of any statutory approvals and report on any non compliance actions that have occurred.

The contractors monthly report will be presented at monthly project environmental meetings attended by a DoC representative.

4.2.5 Non-Conformance

The Contractor will be required to document non-conforming products or process in a Non-Conformance Report. This report would identify the nature of the problem, the proposed corrective action, action taken to prevent recurrence of the problem, and verification that the agreed actions have been carried out.

Section 5

Issues, Opportunities and Management

5.1 Overview

The following environmental topic areas are discussed in this section:

- Section 5.2 – Vegetation
- Section 5.3 – Biosecurity
- Section 5.4 – Earthworks and Leachate
- Section 5.5 – Water Quality and Quantity
- Section 5.6 – Air Quality
- Section 5.7 – Noise
- Section 5.8 – Hazardous Substances
- Section 5.9 – Traffic
- Section 5.10 – Buildings, Structures and Signage
- Section 5.11 – Cultural and Historical
- Section 5.12 – Refuse and Waste
- Section 5.13 – Personnel Behaviour
- Section 5.14 – Health and Safety
- Section 5.15 – Restoration and Rehabilitation
- Section 5.16 – Monitoring and Reporting

For each topic, the management objective, issues, opportunities and management strategies are identified. Due to the interrelated nature of the topics, some overlaps are inevitable.

Note that as identified in Section 1 of this report, the management strategies identified are preliminary only, and will be further developed in consultation with DoC and resource consent authorities.

5.2 Vegetation and Habitat

5.2.1 Management Objective

- a) To minimise the removal and disturbance of indigenous vegetation.
- b) Subject to (a), enhance any indigenous vegetation throughout and following construction.

5.2.2 Issues

Southern beeches and podocarps dominate the forests of Fiordland National Park. Southern beech species are the predominant forest in Mount Aspiring National Park. These forests and their related ecosystems are present at the respective tunnel portals. The forests are a key contributor to the natural and distinctive qualities of the area, for both ecological and amenity/scenic reasons. The National Parks Act 1980 requires that the native plants of the parks shall as far as possible be preserved.

Construction activities associated with the project will result in the removal and disturbance of some indigenous vegetation. This is necessary to install tunnel portals and access, and develop construction management areas.

Section 5

Issues, Opportunities and Management

5.2.3 Opportunities

The Hollyford Airstrip area has been subject to past vegetation clearance associated with operation of the airstrip and from gravel quarrying. Natural processes such as flooding has likely contributed to vegetation loss at the site. An opportunity exists to enhance the vegetation (and subsequently habitat for fauna) at the site when construction is complete, but subject to any constraints imposed by the operational requirements of the airstrip.

5.2.4 Management Strategies

- 1) Vegetation removal and disturbance shall be limited to that shown on the relevant construction drawings.
- 2) Prior to beginning any clearance within 20 m of the limits of disturbance as defined on the relevant drawings, the defined limits of disturbance shall be marked out with clearly visible coloured markers. No bush clearance is permitted within this 20 metre zone without the confirmation of the limits of disturbance by DoC.
- 3) The removal of mature trees shall be avoided as far as practicable at all construction areas and road upgrades associated with the project. Any trees to be removed will be identified in consultation with DoC.
- 4) A vegetated margin of at least 10 metres shall be retained (where a vegetated margin already exists) between the Hollyford River / Whakatipu Ka Tuka and any spoil disposal area, to mitigate against potential sediment runoff.
- 5) Removal of vegetation shall be timed to avoid, to the greatest extent practicable, impacts on avifauna.
- 6) Buffer zones of vegetation shall be retained for visual screening of the works where practicable.
- 7) Following vegetation clearance to the site disturbance limits, a 1 m high wire netting fence shall be erected 1 m inside the Site boundary and around the full perimeter of the cleared area against any bush zone. Fences shall be maintained in good condition and removed on completion of the works (refer Section 5.10 for fence construction).
- 8) Any vegetation removed / cleared from all Site areas shall be shredded and stockpiled. Such material shall be re-used for rehabilitation purposes on completion of the works. Where any organic surface material such as topsoil or moss exists, or stockpiles of fines such as sand, these shall be carefully removed and stockpiled for future use with the shredded vegetation. Unavoidable inclusion of some underlying gravels or rock during this process will be acceptable. The vegetation and surface material may be mixed. Such stockpiles shall be left loose and uncompacted.
- 9) Any construction area not required for operations activities shall be subject to a planting programme to re-establish indigenous vegetation (refer Section 5.15).
- 10) Prior to construction, the merits of collecting seed and establishing an indigenous plant nursery (of local species) shall be explored with DoC.

5.3 Biosecurity

5.3.1 Management Objective

- a) To prevent the further introduction of pest species into the National Parks.
- b) To eradicate any pest plants currently present in the areas affected by construction.

Section 5

Issues, Opportunities and Management

5.3.2 Issues

Under the National Parks Act 1980, introduced species in National Parks are to be, as far as possible, eradicated. This is because introduced species can have undesirable effects on indigenous species and threaten the natural values inherent in the National Parks.

Without mitigation, importation of pest plants into the National Park can occur through several means, including on vehicles, machinery, materials and people. To some extent this may already occur with visitor/tourist activities. Clearance of vegetation associated with construction activities can also provide opportunities for pest plants to expand their current territory.

Didymosphenia geminata is one such pest plant present in areas immediately outside the National Parks and whose entry to the Parks must be avoided.

5.3.3 Opportunities

Pest species may already be present at the sites. An opportunity exists with the project to eradicate these pests from the construction areas and surrounds, and maintain their eradication for the life of the project. For example, at the Routeburn portal, a vermin eradication programme may provide benefits to the local mohua (yellowhead) population.

5.3.4 Management Strategies

- 1) An area shall be provided immediately outside the National Parks, for Steam Cleaning, and washing of any plant and equipment that is to enter the National Parks. All plant and machinery will be thoroughly washed down to ensure that dirt, vegetation and any organic matter is removed prior to entry into the National Parks. This applies specifically to all construction plant, with normal road vehicles being excluded.
- 2) All equipment and plant shall be inspected prior to entry into the National Parks and following cleaning. This shall be undertaken by an independent person. A written quality check shall be issued and must be kept with the equipment/plant at all times during operation within the National Parks.
- 3) Plant/equipment leaving the National Parks shall return its quality check record, and if re-entering go through the same process.
- 4) Materials imported into the National Parks shall be checked to minimise the potential for weed and exotic plant species to enter the National Parks. This check shall be undertaken by an independent inspector, and an inspection certificate issued. For bulk materials that are imported and used, containment or sterilisation shall be used to ensure that weed seeds cannot enter the material or are killed prior to entry to the National Parks.
- 5) Plant and equipment on the site shall be routinely checked for possible alien seeds etc, and to check the written quality check. Plant and equipment which has not been checked or shows signs of inadequate cleaning shall be removed from the site.
- 6) Inspections shall be undertaken in and around the areas of operation on a routine basis to assess weed growth and weeding/spraying carried out to kill weeds. This approach will ensure that any weeds which have inadvertently entered the area, and germinated, will be rapidly killed, minimising the potential for weeds to become established in the area.
- 7) Regular inspections will be carried out and weed control undertaken along the road edges as required, taking particular care of areas where road widening or other disturbance has occurred.
- 8) Weed control shall be undertaken by the use of herbicide from a knapsack sprayer, hand weeding, by hand pulling or by the use of an appropriate hand tool.

Section 5

Issues, Opportunities and Management

- 9) Routine inspections of all construction zones and roadsides will be carried out for two years after the completion of the tunnel and other site works. Routine inspections shall be carried out during April, September and December.
- 10) At the rehabilitated spoil deposit site weed control shall continue for up to five years or until the plantings cover the bare ground and are of sufficient height and coverage to shade the ground and eliminate competition from grasses and weeds
- 11) In consultation with DoC, the existing predator control and monitoring programme in the Routeburn Valley area will be extended to cover all of the beech forest areas below 600m in the vicinity of the Routeburn Road. Funding for this programme would continue for the life of the project.

5.4 Earthworks and Leachate

5.4.1 Management Objective

- a) To carry out earthworks and land disturbance activities in a way that avoids, as far as practicable, the potential for soil erosion, impacts on water quality, and production of dust.
- b) To contain, treat or dispose of any leachate to the extent that there is no impact on water quality.

5.4.2 Issues

Rock and soil plays a critical role in the ecological functioning of the National Parks, and contributes to the distinctive landforms of the National parks and their natural, scenic and amenity qualities.

Works on or near slopes have the potential to mobilise the slope and result in loss of soils (and any vegetation on those soils) and visual scarring. Tracking and vehicle movement can also result in the movement of soils.

Works in or near waterways have the potential to mobilise soils into the surface water. Once in the water the sediment is effectively a pollutant, giving rise to potential adverse impacts on both instream flora and fauna. Sediment plumes in rivers are also visually unattractive and impact on the scenic nature of the waterbodies.

During prolonged periods of dry weather there is the potential for exposed soil surfaces to give rise to dust, by way of vehicle movements or wind. This is visually unattractive, represents a hazards to workers on the site, and may have impacts on surrounding ecological values.

There is a small possibility that material removed from the tunnel could contain mineralisation that could give rise to leachate. Such leachate could have adverse effects on water quality and would need to be fully contained and/or treated.

Relevant construction activities involving earthworks and land disturbance include:

- access and road formation;
- site and construction area establishment;
- removal of spoil from the tunnel; and
- disposal of tunnel spoil and any other excess spoil associated with the project.

5.4.3 Opportunities

The Hollyford Airstrip area is prone to flooding. In addition, it does not comply with Civil Aviation Authority (CAA) requirements. The disposal of tunnel spoil at this site gives rise to the opportunity to raise the airstrip above flood levels, providing long-term protection against such events. The further opportunity exists to form the airstrip to comply with CAA standards.

Section 5

Issues, Opportunities and Management

5.4.4 Management Strategies

- 1) Disposal of spoil and other debris from the works shall only occur in the spoil disposal areas shown on the relevant drawings.
- 2) A perimeter runoff interceptor ring drain shall be constructed around all spoil disposal areas to intercept and channel stormwater through silt traps and settlement ponds. The drain shall be constructed as soon as vegetation clearance has occurred. Drains shall be designed to manage a 20% AEP event.
- 3) Any settlement ponds shall be:
 - designed, constructed and monitored following the processes in the NZSOLD Guidelines November 2000.
 - Designed to manage a 10% AEP design flood, with a provision to pass a 1% AEP design flood.
- 4) The consent holder shall be responsible for the structural integrity and maintenance of all dam works, and for all erosion control and energy dissipation works.
- 5) Where practicable, any perimeter batters shall be completed at the earliest possible stage to allow for re-vegetation.
- 6) The contours of the final surface and batters of the spoil disposal area shall be sympathetic to the surrounding landscape.
- 7) The final surface shall be scarified to a depth of 500 mm (except for the airstrip formation).
- 8) All exposed soil shall be revegetated as soon as practicable following final contouring.
- 9) All practicable measures shall be taken to eliminate any hazard or nuisance to Project personnel and other National Park users resulting from dust created by construction. This includes dust emanating from construction vehicles on roads.
- 10) Spoil removed from tunnel excavation shall be tested for leachate producing properties at least daily or whenever significant change to the rock geology is encountered in the tunnel. If detected, leachate producing material shall be disposed of in a designated and contained section of the spoil disposal area. (Refer Section 5.5 for treatment and monitoring procedures).

5.5 Water Quality and Quantity

5.5.1 Management Objective

- a) To have no adverse impact on surface water bodies beyond a reasonable mixing zone.
- b) To minimise impacts on ground water.

5.5.2 Issues

High quality water gives life to flora and fauna in the National Parks, and its largely pristine and unmodified nature has significant amenity value to Park users and visitors.

Construction activities that may impact on water quality include:

- Earthworks (as discussed in Section 0);
- Disposal of water from the tunnel;
- Disposal of water from the aggregate and batching plant;
- Disposal of surface runoff from construction areas; and

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- Workforce ablution facilities.

5.5.3 Opportunities

No opportunities have been identified with respect to water quality.

5.5.4 Management Strategies

- 1) There shall be no discharge of water or contaminants to any river that, beyond a reasonable mixing zone, results in any adverse change to the insitu water quality parameters, including:
 - No production of conspicuous oil or grease film, scums or foams or floatable or suspended material
 - No conspicuous change in colour or visual clarity
 - Any significant adverse effect on aquatic life.
- 2) At least thirty days prior to commencing any physical work within the National Parks, the following shall be submitted to DoC and the resource consent authorities:
 - a. a detailed design of the temporary sewage collection and treatment system proposed to service the construction workforce.
 - b. a detailed design of the tunnel discharge, concrete batching plant discharge, and stormwater treatment system.
 - c. a detailed design of the tunnel water diversion system.
- 3) All waste water from temporary toilets, showers, and hand basins shall be collected in storage tanks. These tanks shall be sized based on maximum predicted workforce numbers. Effluent shall be removed periodically from the sites by tanker and disposed off at an appropriate facility outside the National Parks.
- 4) Retention tanks or chemical toilets may be used both above ground and underground subject to appropriate provision being made for the disposal of waste.
- 5) Treated tunnel water and stormwater may be discharged into Deadmans Creek. Such discharges shall be subject to the water quality criteria specified below, as measured in the Hollyford River / Whakatipu Ka Tuka.
- 6) Treatment of dirty water discharge from tunnelling operations shall be initially through a settlement pond constructed in the Airstrip Staging Area (primary water treatment pond). If required, secondary treatment using a package treatment plant shall apply to ensure receiving water quality standards are met.
- 7) For the treatment plant at the Airstrip Staging Area the following shall apply:
 - a. Design of the Treatment Plant shall be carried out by a Chartered Professional Engineer experienced in the design of such plants. The design shall include an ability to add additional treatment capacity should the discharge water quantities from the tunnel increase beyond initial design volumes. The design is to include operation and maintenance procedures.
 - b. Minimise the use of flocculants, but use, as necessary to achieve the required water quality, subject to the following:
 - i. Flocculants of the non-toxic polyelectrolyte chemical group (anionic) shall only be permitted.
 - ii. The treatment system shall ensure an efficient use of flocculant, based on flow, and to have appropriate alarm systems to warn of plant or flocculant dosing failure.

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- iii. Handle and dispose of sludge in such a manner as to ensure that sludge particles disposed of in the spoil disposal areas as are not mobilised into the ground water.
- 8) A continuous recording turbidity measurement device shall be installed at the point of discharge of treated water into Deadmans Creek. Continuous records of turbidity shall be correlated to the receiving water quality requirements below to set a maximum allowable level for discharge.
- 9) Measurement and monitoring of the condition of the receiving waters shall be based on turbidity, suspended solids and the Black Disc method as outlined below:
- Measure turbidity of the Hollyford River / Whakatipu Ka Tuka in a natural condition and at the specified receiving water monitoring location twice in every 24 hour period, not less than 6 hours apart.
 - Sample and analyse for turbidity, suspended sediment, particle size and hydrocarbon content at each discharge point (silt pond and primary water treatment pond) once in each 24 hour period. Use turbidity, visual clarity and suspended solids data to derive a correlation between suspended solids and turbidity and visual clarity and turbidity to best utilize continuous turbidity monitors.
 - Measure visual clarity of the Hollyford River / Whakatipu Ka Tuka in its natural conditions and at the specified receiving water monitoring location once in every 24 hour period using the Black Disc method (specified in Appendix A.2 of MfE Resource Management Water Quality Guidelines No 2).
 - Immediately undertake action to correct and mitigate any adverse effects brought about by a non-compliance with a water quality standard.
 - Submit records of all monitoring to DoC and the Regional Councils.
- 10) Water quality requirements are as outlined below [note: some figures will require revision following baseline study]:
- No sediment with a particle size greater than coarse silt (0.063 mm) shall be discharged to the receiving waters.
 - The concentration of total petroleum hydrocarbons in discharges to the Hollyford River / Whakatipu Ka Tuka shall not exceed 15 ppm.
 - The suspended solids content of Deadmans Creek at the discharge point to the Hollyford River / Whakatipu Ka Tuka shall not be greater than 30 g/m³ for more than 5 % of the time.
 - The quality of the receiving waters of the Hollyford River / Whakatipu Ka Tuka 200 m downstream of the confluence with Deadman Creek shall comply with the following:
 - The visual clarity shall not be less than 5.09 m.
 - Except that if the Hollyford River / Whakatipu Ka Tuka clarity is naturally less than 5.09 m in any adjacent 24 hour period the clarity at the measurement point shall not be less than that naturally lesser clarity. (The intent of this exception to the general rule is to cater for runoff in the larger but infrequent storm events.)
- 11) Potential for sediment entrained runoff shall be minimised through the following:
- Minimise the effect of stormwater runoff from spoil disposal areas and cleared ground by keeping the active working area to a minimum and completing areas ready for revegetation at the earliest practicable time.
 - Control sediment runoff from cleared ground and spoil disposal areas to prevent it entering any existing waters untreated.

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- c. Implement such measures as perimeter drains, erosion control, silt fences, bunding around working areas, maximising soakage, check dams, rock lined channels, and energy dissipation structures. Should these or other measures prove unsatisfactory, channel stormwater runoff through the water treatment system.
- 12) Abstraction of water shall only be for the purposes of supplying domestic requirements and the Concrete Batching Plant.
- 13) The flow rate of water discharge from the tunnel shall be measured and recorded.
- 14) In the event that leachate-bearing material is disposed of at the Hollyford Airstrip, a number of options are available:
- Place potentially acid generating spoil at the south end of the spoil dump where there is an existing high point, well above predicted 1% AEP flood levels. Material will be mixed with lime or spoil with high acid neutralising capacity and encapsulated within a low permeability material. This would limit the oxygen flux to the waste and provide acid neutralising capacity for any acid generation.
 - Place the material low in the stockpile so that the groundwater mound that will form under the pile keeps the potentially acid generating spoil close to saturation. This will also limit oxygen flux thereby preventing acid generation.. The adjacent waste rock will have acid neutralising capacity to provide a natural buffering effect, thus providing additional protection.
 - Place the material in a hole excavated beneath the stockpile (eg. to recover coarse gravels and cobbles for use as armour material) so that it will be below the water table and therefore unable to oxidise to the degree necessary to generate acid rock drainage.
- 15) The consent holder shall continuously monitor water entering the settlement pond and water flowing out of the pond outlet for pH and conductivity. The monitoring system shall be fitted with an alarm to indicate when trigger levels [to be determined] for pH or conductivity have been exceeded.
- 16) The settlement pond(s) shall be configured such that in the event that contamination is detected the outflow can be stopped/managed for conditions which do not result in flow over the auxiliary spillway.
- 17) If the trigger levels for pH and conductivity are exceeded, a grab sample of water shall be taken and analysed for pH, conductivity, ammoniacal nitrogen, nitrate nitrogen, alkalinity, chloride, potassium, and total organic carbon.
- 18) If monitoring of the discharge system indicates leachate contamination, then immediate steps shall be taken to prevent further leachate contamination.
- 19) There shall be no refuelling of vehicles or machinery in the bed of any river.

5.6 Air Quality

5.6.1 Management Objective

- a) To minimise the impact of activities discharging contaminants to air.

5.6.2 Issues

Due to the limited influence of humans in National Parks, air quality is generally regarded as pristine. Construction activities that have the potential to impact on air quality include:

- earthworks (producing dust)
- discharge of contaminants from fuel-powered plant, machinery, generators, and vehicles.

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5.6.3 Opportunities

No opportunities have been identified with respect to air quality.

5.6.4 Management Strategies

- 1) All practicable measures shall be taken to eliminate any hazard or nuisance to Project personnel and other National Park users resulting from dust created by construction. This includes dust emanating from construction vehicles on roads.
- 2) Fuel powered machinery and plant shall not be left unnecessarily idling.
- 3) Vehicles and generators will be required to meet relevant emission criteria.

5.7 Noise

5.7.1 Management Objective

- a) To minimise and manage the impacts from construction noise, particularly with respect to impacts on visitors to the National Parks.

5.7.2 Issues

Construction noise is an inevitable aspect of any construction project. Sources of noise during construction of the Milford Dart project include:

- Tunnel excavation and blasting activities;
- Tunnel ventilation fans;
- Mobile plant and machinery, including spoil transport vehicles;
- Rock and gravel crushing;
- Concrete batching plant;
- Staff vehicles; and
- Conversational noise.

5.7.3 Opportunities

No opportunities identified with respect to noise.

5.7.4 Management Strategies

- 1) All practicable measures shall be undertaken to reduce noise levels from plant, equipment and personnel operating on Site to provide a safe working environment and to avoid disturbance to other National Park users.
- 2) All practicable measures shall be undertaken to comply with the requirements NZS 6802:1999 Acoustics – Assessment of Environmental Sound and NZS 6803:1999 Acoustics – Construction Noise.
- 3) Noise measurement and assessment shall be carried out in accordance with NZS 6801:1999 Acoustics – Measurement of Sound, utilising an independent noise expert. The results and conclusions of such assessments are to be submitted to the regulatory authorities on a frequent basis.

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- 4) Noise monitoring will be carried out as soon as practicable after any significant noise source commences work on Site and thereafter whenever any further significant noise source commences work.

5.8 Hazardous Substances

5.8.1 Management Objective

- a) To avoid the entry of hazardous substances into the environment.
- b) To ensure hazardous substances are stored in a secure manner.
- c) In the event of an accidental spillage, remediation of that spillage is to be undertaken immediately.

5.8.2 Issues

Entry of hazardous substances into the environment can have significant impacts on ecological values and must be avoided.

Hazardous substances to be used on the construction sites include in relation to:

- Vehicles and machinery;
- Cement and concrete fabrication;
- Explosives for blasting activities;
- Epoxy resins for rock-bolting;
- Paints for architectural finishing;
- Generators for power for workforce facilities; and
- Generators for power of the tunnel boring machine.

Secure storage of hazardous substances on the site to achieve the above will be necessary.

5.8.3 Opportunities

No opportunities have been identified with respect to hazardous substances.

5.8.4 Management Strategies

- 1) All measures necessary shall be taken to prevent the spillage of hazardous substances during any transport, transfer and storage in the National Parks.
- 2) Any accidental spills shall be remediated immediately.
- 3) All fuel storage facilities installed on the Site shall include appropriate containment in the event of tank rupture and for the collection, treatment and disposal of any spillage should it occur. Containable volumes shall at all times be at least 10% greater than the maximum storage volume.
- 4) Provision shall be made for treating contaminated stormwater runoff from fuel and oil storage areas.
- 5) All hazardous substances are to be stored in a secured location with controlled access.

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5.9 Roads and Traffic

5.9.1 Management Objective

- a) To minimise construction traffic and vehicle movements to the extent necessary to allow a safe and practicable construction programme.
- b) To minimise vehicle emissions.

5.9.2 Issues

The movement of vehicles needs to be kept to a minimum to reduce impacts on the amenity values of the National Parks and visitor experience. Vehicles also emit greenhouse gases and these should be minimised.

5.9.3 Opportunities

No opportunities have been identified with respect to traffic.

5.9.4 Management Strategies

- 1) Workforce personnel to be transported to the sites via van/bus. Personal vehicles are generally not to be brought to the Site, unless prior approved by the contract supervisor.
- 2) Construction vehicle movements on Lower Hollyford Road and Routeburn Road shall not unduly interfere with visitor access to the National Parks.
- 3) Vehicles shall not be left unnecessarily idling.
- 4) Speed on the construction sites and Lower Hollyford and Routeburn Roads will be restricted for the safety of personnel and Park users and to minimise noise and dust generation.

5.10 Buildings, Structures and Signage

5.10.1 Management Objective

- a) To minimise the visual impact of temporary buildings, structures, and signage on the scenic qualities of the National Parks.
- b) To remove all temporary buildings, structures and signage from the National Parks upon completion of the construction phase.

5.10.2 Issues

The relative lack of human influence in National Parks is what contributes to their natural and scenic values. Buildings, structures and signage in National Parks have the potential to detract from these values.

During construction the buildings, structures and signage include:

- Staff facilities (including office, lunch room, ablution block, first aid);
- Workshops;
- Aggregate plant and concrete batching plant;
- Substations;

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- Water treatment facilities;
- Directional signage; and
- Signage required for health and safety purposes.

5.10.3 Opportunities

No opportunities have been identified with respect to buildings, structures and signage at the tunnel sites.

5.10.4 Management Strategies

- 1) At least thirty days prior to commencing any physical work within the National Parks, architectural plans of any buildings shall be submitted to DoC and the territorial authorities.
- 2) All buildings and fixed structures shall be painted in accordance with colour schemes approved by DoC and the resource consent authorities.
- 3) Any fencing shall be galvanised netting or equivalent, clipped to 3.2 mm galvanised wire at top and bottom, and supported by steel stakes, (waratahs or similar), driven into the ground at 3 m centres.
- 4) Site buildings and temporary structures shall only be located within areas identified on the relevant drawings.
- 5) All buildings shall be of a single storey construction unless otherwise approved by DoC and the territorial authorities.
- 6) All permanent buildings (e.g. portal structures) shall be landscaped as soon as practicable following the completion of construction.
- 7) Yards, access roads, staging areas and material storage areas in the National Parks shall be contained entirely within the limits of disturbance defined on the relevant drawings. Such areas shall be maintained in an orderly state.
- 8) Drawings of all construction signage showing size, wording and location of each sign shall be submitted to DoC and the territorial authorities for review ten days prior to manufacturing.
- 9) No advertising shall be erected within the National Parks.
- 10) Roading warning signs shall comply with Transit New Zealand publication "Working on the Roads."
- 11) Non-roading signs shall comply with the following:
 - a. The Project name, Principal and contractors names to be shown on the sign at the Site entrances only. No sub-contractor or supplier names shall be permitted.
 - b. Maximum size of sign: 3 square metres.
 - c. Maximum height above ground: 2.0 metres.
 - d. Typeface: Helvetica or San Serif style only
 - e. Colours shall be restricted to the following: Posts and sign blades to be painted Resene DOC Green.; Letter colour: white; Secondary letter colour for warnings: red; Limited use of other colours is acceptable for logos only.
- 12) Signs shall be located where they are easily noticed but with minimum visual impact.

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5.11 Cultural and Historical

5.11.1 Management Objective

- a) In the event that cultural or historical material is discovered during works, to immediately cease works affecting that material and for statutory process to be followed.

5.11.2 Issues

Cultural and historic sites and values hold a valuable record of New Zealand's history. Preserving these values is important.

Whilst no cultural or historical sites have yet been identified in the immediate vicinity of the proposed construction works, any such discovery needs to be treated very seriously and dealt with through the appropriate statutory channels.

5.11.3 Opportunities

Milford Dart will continue to engage with Tangata Whenua throughout construction of the project. This may include on-site meetings and ceremonies.

5.11.4 Management Strategies

- 1) Should any archaeological material be discovered during the course of any works, all works with the potential to damage or disturb those materials shall be ceased immediately and DoC, New Zealand Historic Places Trust, and Te Ao Marama advised immediately.

5.12 Refuse and Waste

5.12.1 Management Objectives

- a) To minimise refuse and waste production;
- b) To contain all refuse and waste within the construction area boundaries; and
- c) To remove all refuse and waste from the National Park which has the potential to adversely affect National Park values.

5.12.2 Issues

The presence of refuse and waste in National Parks is incompatible with National Park values. The generation of refuse and waste during a large-scale construction project is inevitable, but such generation should be minimised as far as practicable. Additionally, all refuse and waste should be prevented from leaving the site by wind or water action.

Construction activities that can generate refuse and waste include personal waste from staff / workforce, packaging and unused materials.

5.12.3 Opportunities

No opportunities identified with respect to refuse and waste.

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5.12.4 Management Strategies

- 1) Any existing construction debris or waste visible on the surface of the Site areas or dug up during clearing operations shall be collected, stored, and disposed of in the appropriate manner outside the National Park.
- 2) No personal rubbish or offensive material shall be dropped or disposed of within the Park.
- 3) All practicable steps shall be taken to minimise production of and the unsightly collection and storage of refuse or waste on Site.
- 4) Refuse should be disposed of regularly in accordance with the following conditions for each type of refuse:
 - a) Type A - Non hazardous waste which will not produce leachate on decomposition. Remove from the National Park to an established landfill.
 - b) Type B – Tunnel spoil containing leachate producing material. Contain and treat as per Section 5.4 and 5.5 of this report.
 - c) Type C - Hazardous waste (for example oil, hydraulic fluid, chemicals etc). Contain and remove from the National Park and dispose of in a manner approved by the relevant authorities.
- 5) No material, discharge or structure of any kind from the construction works shall be permitted to enter the bush beyond the fenceline, whether it be spillage, wind blown debris or any other material or waste. The clearance boundaries shall be regularly monitored and any debris that has entered the bush shall be removed. The source of debris shall be isolated or eliminated.

5.13 Personnel Behaviour

5.13.1 Management Objective

- a) To ensure staff / workforce operate in a manner befitting of the National Park values.

5.13.2 Issues

Staff must behave in a manner that does not compromise the values of the National Park.

5.13.3 Opportunities

The opportunity exists to educate personnel involved with the project – refer Section 4.2.1 of this report.

5.13.4 Management Strategies

- 1) Refer Section 4.2.1 for staff training programme.
- 2) No pets shall be permitted within the National Parks.
- 3) No feeding or domestication of bird or animal life shall occur within the National Parks.
- 4) No importation, storage or use of firearms shall occur in the National Parks without a current recreational firearms permit from DOC, and any other appropriate permits.
- 5) No open fire shall be lit in the National Parks. Care shall be taken to avoid accidental ignition and spreading of fire.
- 6) No fishing shall occur without a current sports fishing licence for trout fishing in the National Parks.
- 7) The Concessionaire shall manage the contract works so that other users of the National Parks are not hindered or their enjoyment of the National Parks significantly detracted from.

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5.14 Health and Safety

5.14.1 Management Objective

- a) To comply with all relevant health and safety legislation, regulations and procedures, with the intended outcome being the avoidance of harm to workforce and visitors to the National Park.
- b) To identify interfaces of the construction works with the public and manage to ensure the safety of all National Park users and visitors is not compromised

5.14.2 Issues

The health and safety of all workers involved in the construction of the Milford Dart project, and the health and safety of all visitors to the National Parks that may be affected by the project, is of the utmost importance.

5.14.3 Opportunities

No opportunities identified with respect to health and safety.

5.14.4 Management Strategies

- 1) Comprehensive health and safety plans shall be developed for the construction phase in accordance with the Health and Safety in Employment Act.

5.15 Restoration and Rehabilitation

5.15.1 Management Objective

- a) To ensure that all construction areas not subject to operational buildings/ structures and access are restored, rehabilitated and enhanced to a higher degree (taking into account the time it takes for restoration and rehabilitation to occur) over its current state.
- b) To rehabilitate and enhance vegetation (in accordance with Section 5.1 of this report).

5.15.2 Issues

Construction activities will result in a temporary impact on National Park values. It is necessary to restore the National Park values at the end of construction to at least its pre-construction state. As discussed in Section 5.15.3 below, opportunities exist for enhancement and these should be taken where practicable.

5.15.3 Opportunities

As discussed in Section 5.1 "Vegetation", opportunities exist to enhance the existing values of the Hollyford Airstrip. Following construction, Milford Dart intends to enhance the indigenous vegetation and habitat value at the site over that which occurs now, to the extent that it remains safe for the continue operation of the airstrip.

5.15.4 Management Strategies

- 1) On completion of work at any location, all plant, equipment, fuels, hazardous substances, buildings, fencing, signage, debris, rubbish and any other materials brought onto Site shall be removed, and the Site left clean.

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- 2) All areas disturbed by spoil disposal, vegetation clearance, and soil disturbance shall be rehabilitated with the end aim of achieving 'National Park' standard. All rehabilitation and restoration activities will be undertaken in close consultation with DoC.
- 3) Opportunities for vegetation enhancement, as identified in Section 5.1, shall be undertaken.

5.16 Monitoring and Reporting

5.16.1 Management Objective

- a) To monitor and record all those matters necessary to demonstrate compliance with statutory approvals.
- b) To maintain regular contact with regulatory authority representatives to review work performed on site, the management plans and effects on the environment.

5.16.2 Issues

The management, monitoring and reporting of impacts on the environment is a critical step in ensuring environmental targets are being achieved and all statutory approvals are being complied with.

5.16.3 Opportunities

To carry out a monitoring and reporting system with the overall objective of achieving a world class engineering and environmental project which has zero adverse impact on the National Parks.

5.16.4 Management Strategies

- 1) A monthly report shall be submitted to the regulatory authorities within 5 days of the end of each month to demonstrate compliance on environmental aspects and any non-compliances (and related corrective actions) which have occurred.
- 2) Hold monthly meetings on site during construction with regulatory authority representatives to review environmental performance against the CEMP.